Topically Applied Corticosteroids and Cromolyn Sodium in Managing Rhinitis

CORTICOSTEROIDS are effective in treating various forms of rhinitis. The usefulness, however, of this class of drugs has been severely hampered by the profound side effects occurring as a function of time, dosage and individual sensitivity. In an effort to circumvent this problem, efforts have been directed toward the development of topically applied glucocorticoids capable of effecting a high degree of potency while being absorbed in insufficient amounts to cause adrenal suppression or cellular toxicity.

Three topical corticosteroids have been approved in the United States for the treatment of rhinitis and a fourth is currently undergoing clinical trials. Dexamethasone phosphate (Decadron Turbinaire) induces some adrenal suppression at a dose of 1 mg per day (12 inhalations), thereby limiting its usefulness. Beclomethasone dipropionate (Vancenase or Beconase) has the advantage of slow absorption from mucous membranes and rapid metabolism, lending a significant degree of freedom from adrenal suppression at its therapeutic dosage range of 400 to 600 μg per day (8 to 12 inhalations). Flunisolide (Nasalide), like beclomethasone, is free of significant adrenal suppression at therapeutic dosages (200 to 300 μg or 8 to 12 inhalations per day) due to its "first pass" mechanism of elimination and a short half-life of 1.8 hours. Recent clinical trials with fluocortin butyl have shown similar efficacy and safety data.

Cromolyn sodium is a mast cell stabilizer that has proved relatively efficacious and very safe in the treatment of allergic bronchial asthma. It has recently been marketed as an intranasally given solution (Nasalcrom) for the treatment of allergic rhinitis. Clinical trials have indicated that it is probably as effective as antihistamine. Its usefulness is limited by frequent applications (four to six times per day). Furthermore, both cromolyn sodium and the topical corticosteroids do not usually produce an immediate response. This is important to emphasize when prescribing the medication because patients will expect a "nasal spray" to produce immediate dramatic improvement; similarly, usage "as needed" should be discouraged in favor of a regular regimen.

The choice of medication should be predicated in part on the severity of the disease, the presence or absence of polyps and the patient's prior response to medication. For example, Nasalcrom might be an effective medication in a patient who had excellent response to antihistamines but could not tolerate the drowsiness. On the other hand, if antihistamines are clearly ineffective or nasal polyps exist then a topical steroid such as beclomethasone or flunisolide should be considered.

GARY A. INCAUDO, MD
Chico, California

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Rhinometry

NORMAL INSPIRATORY CURRENTS first enter the nasal alae, then turn upward through the nasal valve and pass across the inferior and middle turbinates into the nasal pharynx. Fully 60% of an inspired breath, about 300 ml (presuming a tidal volume of 500 ml), is inhaled 16 to 20 times per minute; cold, dry air is warmed to about 30°C (86°F), moistened to 80% humidity and filtered. Under normal conditions and quiet breathing, there is an alternating cyclic activity within the two nares. A normal healthy person inhales the vast majority of inspired air through one nostril, due to the erectile tissue causing shrinking of the nasal turbinates on one side while the opposite turbinates are filling and thus partially occluding the other nostril. Deflections of the septum, masses in the nose or hypertrophy of the mucous membrane will obstruct the air flow. When partial bilateral obstruction occurs, the patient may perceive this as fluctuating unilateral obstruction.

Rhinometry is the measurement of nasal air flow. Air flow rate (V) is determined by the patency of the passage, the manner in which the air flows (laminar or turbulent) and the pressure difference (ΔP) from the external atmospheric pressure to the retronasal space.

Many methods have been used to measure nasal patency. Any acceptable technique requires the continuous measurement of V and ΔP. One currently popular technique is anterior rhinometry, so called because all measurements are obtained from the external surface of the nose. A pneumotachometer calibrated for flow rate is fitted with a plastic rubber-tipped nosepiece. This is placed against the opening of one nostril. As the patient inspires, air moves through the pneumotachometer. A pressure tap on the pneumotachometer measures external nares pressure. Another similar nosepiece is placed against the opposite nostril. This one is connected to a pressure transducer that records the pressure within the nostril, reflective of the retronasal pressure. The signal from it is viewed on an oscilloscope, an XY recorder or a direct digital readout instrument. When a satisfactory recording has been obtained, the tubes are switched to measure the other nostril. Anterior rhinometry has the advantages of being simple to do (even small children may be easily measured), rapid (takes less than 30 seconds) and informative about the patency of each nostril. Furthermore, the values are readily reproducible when done by an experienced technician.

A second method is posterior rhinometry. It requires the retronasal pressure to be measured from a tube in the mouth. This technique usually uses a face mask fitted with a pneumotachometer. Generally, posterior rhinometry is more expensive and complicated. While some patients can do the maneuver immediately, others have to be trained to relax their tongue to allow the oral cavity to communicate with the retronasal space. Also, the mask technique provides only a total reading of air flow for the two nasal passages.

Another technique to measure nasal patency uses the Wright peak flow meter. This system evaluates nasal function during expiration, which seems less logical than

inspiratory studies because patients complain of inspiratory difficulties when congested. In addition, the important nasal functions of air conditioning, cleaning and olfaction are carried out during inspiration. It should be noted that inspiratory flow values differ from expiratory because of the negative airway pressure and the flaring of turbinates into the airstream during inspiration. The least desirable aspect of this technique is that forceful expiration blows secretions into the measuring instrument.

Rhinometry can be valuable in medical practice. Clinically, the technique is useful in documenting and monitoring the degree of nasal obstruction. In diagnostic work it can help differentiate impairment due to structural or mucosal changes by obtaining values before and after a nasal decongestant; similarly, challenge studies can confirm the etiologic role of various inhalants. It may also be helpful in determining the effectiveness of medication or surgical treatment.

ELI O. MELTZER, MD
San Diego

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The Radioallergosorbent Test

THE DIAGNOSIS and management of atopic allergic disease depends on correlating historical and physical findings with identification of IgE antibodies specifically directed at one or more allergens. Knowledge of specific antigen sensitivity is important in directing environmental controls, in predicting exacerbations (after exposure to pertinent antigens) and in planning appropriate immunotherapy when indicated. The radioallergosorbent test, or RAST, is the most commonly used in vitro assay for detecting these antibodies.

RAST is a sandwich-type radioimmunoassay. Allergen-specific IgE in a serum sample binds solid-phase coupled allergen usually on a paper disk. An anti-IgE antiserum will "sandwich" the bound IgE. After washing, the amount of radioactivity is proportional to the amount of specific IgE in the serum sample. Results are expressed semiquantitatively and are assigned to classes based on comparison with reference sera.

For clinical use, skin testing is generally considered more sensitive than RAST. Attempts to increase RAST sensitivity by lowering thresholds or by modifying the scoring system have generally led to an unacceptable number of false-positive results. RAST is, however, preferable to skin testing in selected instances. Patients with a history of anaphylaxis, especially some with pronounced food sensitivities, are at risk for exacerbation with skin testing, whereas those with severe dermatoses may present insufficient normal skin to permit accurate testing. Dermatographic patients may wheal and flare on a non-IgE mediated basis making skin testing uninterpretable. It is generally agreed that skin testing is contraindicated during pregnancy and that RAST is an acceptable alternative. Infants and toddlers with atopic disease are physiologically capable of immediate hypersensitivity responses on skin testing and can be tested reliably. However, some children are made so anxious by procedures, even the minimally painful prick-puncture test, that RAST may be better tolerated. RAST carries no patient risk and may be performed in patients on antihistamines.

The radioallergosorbent test methodology has been useful in identifying the immune consequences of immunotherapy and for isolating and identifying allergenic components. Fractionated antigens can be assayed in RAST inhibition assays, in which soluble antigen competes with solid-phase antigen for antigen-reactive IgE. This method has also been successful in precisely quantitating potency of allergenic extracts, the more allergenic in the extract the greater the inhibition of the RAST. Such identification and quantification are crucial for the development of standardized allergen extracts. Establishing dose requirements for immunotherapy by RAST is currently under study, but present practice generally uses skin testing with pertinent antigens before instituting this therapeutic modality.

Skin testing has historically been less expensive, more flexible and more available than RAST. A number of commercially available technological variations of RAST now exist. However, the American Academy of Allergy and Immunology has warned of the potential for abuse in the form of questionable marketing tactics and poor quality control, which could lead to unnecessary testing and increased medical costs.

Despite the availability of new in vitro systems, skin testing is still less expensive and more sensitive and remains the standard for allergen-specific IgE detection; RAST must be regarded as a supplemental technique. Either method requires that a physician be trained in the use and the interpretation of these tests. The detection of allergen-specific IgE is only meaningful when it correlates with a patient's illness.

SETH ASSER, MD
ROBERT N. HAMBURGER, MD
La Jolla, California

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Venom Immunotherapy in Children

THE DEVELOPMENT of purified Hymenoptera venoms for the diagnosis and treatment of venom hypersensitivity has been a major advance in the care of allergic patients. To date, most information regarding this potentially lethal disorder (50 to 200 persons die each year in the United